REMARKS

Claims 13-16 are pending. Claims 13 and 14 have been amended. New claims 15 and 16 have been added. No new matter has been introduced. Reexamination and reconsideration of the application are respectfully requested.

In the April 28, 2003 Office Action, the Examiner rejected claims 13 and 14 under 35 U.S.C. §112, first paragraph, as containing subject matter not described in the specification. The Examiner rejected claims 13 and 14 under 35 U.S.C. §112, second paragraph, as failing to set forth the subject matter which applicant regards as the invention. The Examiner rejected claims 13 and 14 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,018,507 to Takeda et al. ("the Takeda reference"). The Examiner rejected claims 13 and 14 under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,663,941 to Aoshima ("the Aoshima reference") considered with either U.S. Patent No. 6,011,762 to Watanabe et al. ("the Watanabe reference"), or the Takeda reference. These rejections are respectfully traversed.

The present invention relates to a method and system of recording information on an optical disk utilizing a mark-length recording scheme. Tracking control is performed using tracking error signals detected during an OFF period and a rear time segment within an ON period of a recording pulse signal. The time segment for detecting the tracking error signal within the recording pulse ON period is variably controlled in accordance with recording conditions, such as a disk type and recording speed. Tracking control during recording is conducted such that pit forming efficiencies of an inner and outer circumference side of the track are balanced and center lines of both the pit and the track are substantially coincident.

Applicant respectfully submits that support for independent claims 13 and 14, as amended, may be found at, for example, page 6, line 5 to page 10, line 9, page 30, line 14 to page 32, line 16, and page 7, line 21 to page 8, line 15 of the Specification as originally filed. At page 7, line 27 to page 8, line 2 the Specification recites that "if the recording is effected with the influence of the residual heat left unremoved, a portion of a pit, closer to the inner edge of the currently-recorded track, is formed more efficiently."

The Specification teaches that the pit forming efficiencies of the inner circumference side portion of the pit and the outer circumference side portion of the pit are different, and further, the pit forming efficiency of the inner circumference side portion of the pit is more efficient. Support for this is found at page 8, lines 3-5 wherein the Specification states "so that a reflection from that inner portion of the pit will have a reduced light amount as denoted by a dotted line curve in section (b) of Fig.4." Also, lines 13-15 recite "note that a hatched portion in section (b) of Fig. 4 represents energy which is consumed to cause variation in the dye layer."

Referring to Fig. 4, the dotted line corresponds to the reflection light level of the inner portion of the pit and the solid line corresponds to the reflection light level of the outer portion of the pit. In addition, the hatched areas above the dotted line and above the solid line, respectively, correspond to energies consumed when the pit is formed. The energy consumed by the inner portion of the pit is larger than that by the outer portion of the pit. Thus, pit forming efficiencies of the inner and outer portion of the pit are different. Applicant found that to form a pit on the track with their centers being substantially coincident, it is necessary to make pit forming efficiencies of the inner and outer portion of the pit relative to the offset light beam be equal to each other in

amount. Moreover Applicant found that to balance pit forming efficiencies of inner and outer circumference side of the track relative to the offset light beam, it is achieved by outwardly offsetting the axis of light beam in an amount such that the pit forming efficiencies of inner and outer circumference side of the track relative to the offset light beam are to be balanced.

Furthermore, Applicant found that to obtain the offset amount and to control tracking with the offset amount, the difference between the reflection light level of inner and outer portion of the pit is useful and the offset amount is derived from the difference and controlled by variably selecting a detecting time period, namely a rear time segment range within a recording pulse ON period, according to one of the recording conditions.

Independent claim 13, as amended, recites:

forming pits sequentially from an inner circumference to an outer circumference of the optical disk by a light beam irradiated onto a track formed as a groove or land on a recording surface of the optical disk; and

performing tracking control by offsetting a center of an optical axis of the light beam, by a predetermined amount, from a center line of the track toward the outer circumference of the optical disk, the predetermined amount being such that pit forming efficiencies of the inner and outer circumference sides of the track relative to the offset light beam are to be balanced.

The Takeda reference is directed to an optical recording method such that when an optical pickup is moved over an optical disk such as a DVD, the optical pickup being positioned onto the target track location, record marks are recorded onto the optical

disk by a light beam irradiated onto the optical disk through the optical pickup. An irradiation position of the light beam is offset during recording by a predetermined amount to a track at the recording direction side relative to the target track location, and a record mark is formed on a target track by the offset light beam.

The Takeda reference does not disclose, teach, or suggest the method of independent claim 13, as amended. Unlike independent claim 13, as amended, the Takeda reference does not show performing tracking control in such a way that "offsetting a center of an optical axis of the light beam, by a predetermined amount, from a center line of the track toward the outer circumference of the optical disk, the predetermined amount being such that pit forming efficiencies of the inner and outer circumference sides of the track relative to the offset light beam are to be balanced."

The Takeda reference discloses that, during recording, a light beam spot is offset on the outer circumferential side of the pregroove (land) track to the extent that the inner circumference of the light beam spot does not exceed the inner edge of the pregroove (land) track so as not to overwrite on the inner land track in which information has already recorded. With this recording manner, the recorded pit has a hemi-sphere shape or hemi-oval shape. In other words, the pit forming efficiencies of the inner and outer circumference sides of the track are different. Though the Takeda reference discloses plus or minus values of offset value alpha, the Takeda reference only discloses outwardly offsetting. The sign of alpha depends on tracking error signal polarity. The polarity of tracking error signal alternates between pregroove tracking and land tracking. If alpha has a plus sign when pregroove tracking, then alpha has minus sign when land tracking. Thus, the Takeda reference discloses only one directional

offset, namely in a radial direction of the recording direction, furthermore by a detrack-offset amount alpha. The detrack-offset amount has just one value of alpha, and does not have a range from (-)alpha to (+)alpha.

The Aoshima reference relates to an optical disk recording device that can improve or maintain its tracking servo system reliability even though a recording speed increases. Although the recording speed increases, the response speed of a photodetector for detecting a tracking error signal may not increase at same rate, and usually remains as it was. This slow response deteriorates the reliability of tracking servo system by narrowing a feasible range for tracking error signal detection within a recording pulse OFF period or by letting a noise component affect the tracking error signal. The Aoshima reference discloses an increase of the bottom power within recording pulse OFF period, such increase being enough for avoiding the deterioration, even with the dull photodetector.

The Aoshima reference does not disclose, teach, or suggest the method of independent claim 13, as amended. Unlike independent claim 13, as amended, the Aoshima reference does not show performing tracking control in such a way that "offsetting a center of an optical axis of the light beam, by a predetermined amount, from a center line of the track toward the outer circumference of the optical disk, the predetermined amount being such that pit forming efficiencies of the inner and outer circumference sides of the track relative to the offset light beam are to be balanced."

The Watanabe reference relates to an optical disk apparatus that can correct a servo system offset that the apparatus intrinsically has. The optical disk apparatus measures the intrinsic offset of the servo system, and corrects the intrinsic offset by

adding a same offset value of opposite direction.

The Watanabe reference dose not disclose, teach, or suggest the method of independent claim 13, as amended. Unlike independent claim 13, as amended, the Watanabe reference does not show performing tracking control in such a way that "offsetting a center of an optical axis of the light beam, by a predetermined amount, from a center line of the track toward the outer circumference of the optical disk, the predetermined amount being such that pit forming efficiencies of the inner and outer circumference sides of the track relative to the offset light beam are to be balanced."

Any combination of the references does not disclose, teach, or suggest the method of independent claim 13, as amended.

Independent claim 14, as amended, recites limitations similar to independent claim 13, as amended. Accordingly, Applicant respectfully submits that independent claim 14, as amended, distinguishes over the above-cited references for the reasons set forth above with respect to independent claim 13, as amended.

New claims 15 and 16 have been added to further define Applicant's invention. New claims 15 and 16 recite limitations similar to independent claim 13, as amended. Accordingly, Applicant respectfully submits that new claims 15 and 16 distinguish over the above-cited references for the reasons set forth above with respect to independent claim 13, as amended.

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Applicant believes that the foregoing amendment and remarks place the application in condition for allowance, and a favorable action is respectfully requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles telephone number (213) 488-7100 to discuss the steps necessary for placing the application in condition for allowance should the examiner believe that such a telephone conference would advance prosecution of the application.

Respectfully submitted,

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